Department of Agriculture, Trade and Consumer Protection
Division of Marketing
Agricultural Development & Diversification Program (ADD)
2000 Grant Project Final Report

Contract Number: 14105

Grant Project Title: Strawberry Breeding- The Development of New Commercial Cultivars for the Wisconsin Grower

Project Beginning Date: 9/1/99 Project End Date: 9/l/00

Amount of Funding Awarded: $11,522.00

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Continuation of Report

This project was unique since the original intent was to improve the profitability of existing and future Wisconsin strawberry growers by developing and providing them with new, adapted, more productive strawberry cultivars. These new cultivars would require less inputs since they would have increased winter hardiness, disease resistance and other stress tolerance. The concept of this project then, departs from the typical business development/sales improvement projects funded through the ADD program.

Funds for this project so far have been used to plant larger numbers of seedlings to select superior types from and to evaluate "advanced selections" already on track for cultivar development and release for commercial grower trial plantings. Funds were also used to increase the amount of winter hybridization conducted in the UW-River Falls Campus greenhouses. As a result, this project now encompasses 16 acres and has doubled in size and effort. This greatly shortens the time required between hybridization and release of a final product (a new strawberry cultivar) to our Wisconsin commercial growers. Other facets of this project have included industry characterization surveys and evaluation trials.

The objective of the evaluation trials has been to test new/existing cultivars released from other regions of North America. Based on these results Wisconsin growers receive recommendations on which cultivars to plant commercially until Wisconsin cultivars become available. The economic impact is projected to substantial. An estimated 75% of state growers are contacted and provided this information. The cultivars they plant in response to our recommendations typically yield far better than the average, thus increasing profitability on a per acre basis a minimum of 30%.

A new survey was distributed to Wisconsin strawberry growers in Spring 1999 at a statewide meeting and approximately 60% of the surveys were completed and returned. The survey was designed to accurately characterize Wisconsin Berry Growers and allow us to fine-tune our support programs at UW-River Falls. Data from this survey is found later in this report and is entitled "Results of a Berry Grower Survey." One of the most striking trends illustrated by this survey is the rapid grower adoption of new cultivars. We believe the new culivars on the horizon developed at UW-RF will be adopted quickly and used extensively.

A new evaluation trial was established in Summer 1999. Each replication of a new cultivar or selection is a 25 foot row. This is a large 3-replicate trial that includes 58 entries, of which 28 are UW- River Falls strawberry breeding program advanced selections. These 28 most elite UW-selections from 1996 and 1997 characterize the philosophy of the new "Fast Track" program. Strawberry advanced selections were usually evaluated 3-4 years before reaching replicated yield trial testing, but under the new system we can place the most promising in simulated commercial trials within 2 years. As is indicted by the performance data listed in our "2000 Junebearing Strawberry Cultivar Trials Report", River Falls breeding selections are found as highest or near highest yield performers in every ripening season category.

Much more promising progress has been made this past year as compared to 1997. More commitment to careful maintenance and observation of advanced selections has helped streamline our "Fast Track" system.

From the 2,673 seedlings planted in Summer 1998, we selected 49 advanced selections in Summer 1999. Of the 49 advanced selections from Summer 1999, approximately 18 have been placed in the "elite" category for 2000. The following table summarizes the status of best selections from 1998, 1999, and 2000.

Elite Advanced Selections
Summer 2000[z]

	Advanced Selection ID		
1.	98-7-1	27.	98-114-13
2.	98-9-35	28.	98-114-14
3.	98-12-31	29.	99-57-64
4.	98-13-5	30.	99-58-41
5.	98-14-18	31.	99-59-7
6.	98-14-28	32.	99-60-2
7.	98-37-8	33.	99-60-8
8.	98-42-24	34.	99-60-22
9.	98-53-14	35.	99-60-45
10.	98-55-13	36.	99-63-6
11.	98-58-3	37.	99-69-28
12.	98-66-61	38.	99-116-69
13.	98-78-24	39.	99-118-3
14.	98-88-2	40.	99-127-61
15.	98-93-16	41.	99-130B-4
16.	98-101-5	42.	00-23-26
17.	98-108-15	43.	00-27-24
18.	98-108-46	44.	00-33-1
19.	98-110-2	45.	00-39-5
20.	98-111-7	46.	00-41-13
21.	98-111-11	47.	00-44-7
22.	98-111-12	48.	00-48-2
23.	98-111-14	49.	00-60-50
24.	98-112-1	50.	00-62-1
25.	98-112-2	51.	00-67-29
26.	98-112-5	52.	00-68-36

[z] 1998, 1999, and 2000 Advanced Selections evaluated for 3/2/1 year(s) respectively; and originally selected from 2,737/2,673/3,005 total seedlings in 1998,1999, and 2000; and as of Summer 2000, number of original advanced selections selected from total 103/49/48 for 1998, 1999, and 2000 respectively.

Strawberry seedlings for selection in Summer 2001 were planted in June 2000. The 4,949 seedlings were derived from 129 different parental combinations.

Attached are additional report specifics and “spin-offs” from this ADD project.

We believe that this ADD grant was extremely beneficial to allow us to upgrade our program and better serve Wisconsin growers through the anticipated introduction of profitable new cultivars. While it has and will be difficult to document an actual “dollar value benefits” from this project, we believe it can have more long term and far-reaching potential than just about any other type of investment.

ADD Final Strawberry Breeding Report Addendum

The elite UW-RF Strawberry Selections developed in part through this ADD grant are not currently at a stage for general distribution. One of the "bottlenecks" has been a limited number of plants available for testing. In response, these selections were planted last summer in a propagation block on 8 foot row spacings instead of the normal 4 feet. The elites will runner freely to an anticipated 2-600 plants per selection by the end of Summer 2001. The next step will be to send them to other Universities and commercial growers for limited testing in Spring 2002. We expect the University of Minnesota will be the first University location along with 3-4 Wisconsin commercial growers. Each grower will receive from 50-150 plants. These test growers will receive an evaluation form to fill out. Initial reports on commercial selection potential/performance will come in by the end of Summer 2003 (first fruiting season).

We anticipate selections that continue to look promising will be of limited availability to the general commercial growers/and public by 2005.

Restrictions to following past and present projected timeframes involve plant protection issues. There are several routes a breeder can take for introducing a new cultivar/variety. Of paramount importance is, of course, continued funding to maintain a viable program and recognition for the University and state. The goal of programs such as the "UW-RF Strawberry Breeding" is to become at least partially self sustaining from royalties charged by plant nurseries based on the number plants sold of a newly developed cultivar. These royalties are then sent back to the University which assumes its share to cover costs of providing support , land and facilities. The remaining portion of these royalties are then targeted for the actual breeding program.

If new strawberry cultivars are distributed to growers too early in the developmental stage, they become "public domain" and are non-patentable based on guidelines from the U.S. Plant Patent Office. If this occurs, then there is no clear route for the program to be reimbursed for its efforts. This lack of a funding source could kill the program. One could argue that since in part state funds were used to develop a cultivar, then it should be freely distributed to the public, although this again leaves the program with significantly fewer funds to operate with. The actual royalties paid per 1,000 plants is very small (about $1-$5), but greatly enhances the breeder's potential to continue cultivar development.

The application process for a plant patent is very involved and somewhat expensive. All traits unique to the cultivar must be carefully documented--not to mention all the legal hoops that need to be jumped through! Once awarded, a plant patent is legal protection that can be enforced. If plant nurseries and growers or private individuals propagate this cultivar through "pirating" without a special license, they stand to incure substantial fines and possible incarceration. With a plant patent, royalties collected by nurseries are sent back to the University on a regular basis along with documentation as to exact plant numbers sold.

The actual patenting process requires 3-4 years to complete. Typically, a division of the University System such as WARF (Wisconsin Alumni Research Foundation) or a subsidiary of WARF such as WiSys Technology Foundation Inc. will handle most of the patenting formalities, but must also be "sold" on the marketability /potential profitability of the product since their funds are used for the cost of the patent. Since WiSys would potentially pay for the cost of patenting, it would also assume a share of the royalties, thus further reducing actual funds available for cultivar development.

Another option for cultivar introduction is to assign one or a group of nurseries to propagate the new cultivar and sell it to growers without patent involvement. Theoretically, royalties could still be charged and funnel back to the breeding program but nothing could be enforced. This "honor system" for collecting non-patent royalties has worked well in several situations but can also be a complete failure if other nurseries decide to pirate the new cultivar, propagate it, sell it, and not charge royalties or send funds back to the University.

The scenarios outlined above are evidence of the complexity involved in distributing new "inventions" (cultivars). Both practical problems (propagation) and legal issues can delay the availability to commercial growers. We are conferring with representatives of WiSys, other Universities, and plant nurseries to try to sort out the best way to proceed with the least amount of complications.

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SMALL FRUIT RESEARCH REPORT 2000

submitted by

BRIAN R. SMITH
EXTENSION FRUIT SPECIALIST
THE UNIVERSITY OF WISCONSIN-RIVER FALLS

to
Members of the
NCR-22 SMALL FRUITS
And
VITICULTURE COMMITTEE
October 26-28, 2000
Columbus, Ohio

2000 STRAWBERRY BREEDING PROGRESS REPORT

PRINCIPAL INVESTIGATOR
BRIAN R. SMITH
UNIVERSITY OF WISCONSIN-RIVER FALLS

OBJECTIVE 1: (Short & long term) Junebearing cultivar development. Develop Junebearing cultivars incorporating high yield potential, superior flavor, fruit size/firmness and winter hardiness.

OBJECTIVE 2: (Long term) Continuous Source Population Improvement. Screen *F. virginiana* ssp *virginiana* Staudt (Wild Scarlet or Virginia strawberry) and ssp *glauca* Staudt, *F. ovalis* (Lehn.) (Rocky Mountain strawberry) and *F. chiloensis* (L.) Duch. (Frutillar, Chilean or beach strawberry) for unique characteristics such as winter hardiness, drought tolerance, fruit color and flavor and incorporate superior selection in crosses with *Fragaria* x *ananassa*.

OBJECTIVE 3: (Long term) Develop commercially acceptable cultivars resistant to tarnished plant bug injury.

Since 1990, the Wisconsin Berry Growers Association (WBGA) has been the primary source of funding for this program. Other sources include Environmental Protection Agency, USDA, North American Strawberry Growers Association, Smithberry Farms, Mitchell, SD, University of Wisconsin System Grants, University of Wisconsin-River Falls, Wisconsin Dept. of Agriculture, Nourse Farms, Inc., Norcal Nursery, and Indiana Berry Farms.

The strawberry breeding program at the University of Wisconsin-River Falls was initiated in the fall of 1988. Since 1988, over 34,133 seedlings have been planted, and 24,010 screened and selected from. Approximately 4,949 seedlings were field planted this last summer to be evaluated June 2001. The total seedling population from 1988-2000 represent over 1,020 families or cross combinations. This is a distinct departure from traditional breeding programs usually characterized by fewer crosses and larger progenies. The objective has been to screen large numbers of cross combinations for potential performance. Each succeeding year, those parental cross combinations identified as producing a high percentage of superior seedlings are planted in greatly expanded numbers, thus reducing the number of "exploratory" cross seed planted each year. Concurrently, a large number of advanced selections have been identified from 1989 to 2000 (approximately 957 – 3% selection pressure as compared to traditional breeding program .5-1% selection pressure). This was decided because of past observations of complications with juvenility effects and short growing seasons. To compensate for the large advanced selection numbers, a high turnover rate has been established.

The cumulative number of advanced selections (957) broken down by year and those remaining that are used in breeding or have cultivar potential as of Fall 2000 are in the following table:

YEAR	NUMBER OF SEEDLINGS PLANTED	ORIGINAL NUMBER OF SELECTIONS MADE	NUMBER OF REMAINING SELECTIONS AVAILABLE TO BE USED IN BREEDING PROGRAM	NUMBER OF REMAINING SELECTIONS UNDER EVALUATOI AS CULTIVAR POTENTIAL
1989	2,054	----	0	0
1990	4,023	77 (from 1989 seedlings)	0	0
1991	2,073	171	0	0
1992	1,944	179	0	0
1993	1,710	91	0	0
1994	3,066	77	0	0
1995	2,100	75 (from 1994 seedlings)	2	2
1996	1,298 (Includes 376 TPB seedlings)	27 (from 1995 seedlings)	15	15
1997	3,995 (Includes1,258 TPB seedlings)	12 (from 1996 seedlings)	10	10
1998	3,916 (Includes 1,243 TPB seedlings)	103 (from 1997 seedings)	55	28
1999	3,005	98 (includes 6 TPB and 42 pink flowered selections from 1998)	98	50
2000	4,949	47 (from 1999 seedlings)	47	44
TOTALS	34,1333	957 (includes 21 TPB sels.)	227	149

In the past ten years, 350 advanced selections have been incorporated in the breeding program. Currently, 150 advanced selections from the UW-River Falls Breeding Program and 45 clones/cultivars originating worldwide are potted and on hand for winter hybridization in 2001.

The Fall of 1999 was very warm (November warmest on record for 150 years) December also began warm, but then a -17^0 F on 12/21 changed things dramatically. Even with a winter low of -24^0 F on January 21, the 99/00 winter was considered the warmest on record. Temperature extremes/snow cover conditions were:

50^0 F	December	03	
-19^0 F	December	22	3.5" snow cover
52^0 F	December	29	3.0" snow cover
-24^0 F	January	21	10.0" snow cover
61^0 F	February		29
68^0 F	March	4*	
72^0 F	March	5*	
69^0 F	March	6*	
74^0 F	March	7*	
69^0 F	March	8*	

* (All time records)

First and last snowfall of the season were November 23, 1999 (2") and March 9, 2000 (1.5") respectively. The 2000 spring season was characterized as mild and below average precipitation. A string of 80^0 F+ days in early May - 84^0, 89^0, 88^0, 84^0 on May 3, 4, 6, 7, respectively, forced the strawberry plants into very active growth, with blooms just 15 days after uncovering. Strawberry plants were re-covered with straw prior to 32^0 frosts on May 14 and 15. Strawberries were uncovered again on May 16. Irrigation was used for frost control on May 19 (23^0 F) and May 20 (30^0 F). Temperature extremes ranged from 23^0 F (May 19) to 93^0 F (June 8) during the 54 day bloom/berry development and harvest period.

Descriptions of the most promising recent advanced selections evaluated in Summer 2000 are as follows:

00-23-26 (Latestar x RF 94-22-13) Very vigorous, healthy plants produce multitude of runners. Large, bright red conical fruit with pleasing flavor. High yield potential.

00-27-24 (Midwest Cultivar x Seneca) Very late season; producing long, dark red, glossy, very firm conic. Excellent flavor. Very sweet. Quite resistant to fruit rots.

00-33-1 (Mira x Eastern Cultivar) Prodigious production of large, uniform, perfectly conical, dark red, glossy, very firm fruit with well-balanced flavor. Fruit held close to ground. Weak peduncles.

00-39-5 (USDA Selection x Honeoye) Best flavor of all the seedlings! Dark red, glossy, wide conic. Vigorous, healthy plants with good runnering potential.

00-41-13 (Western Cultivar x Honeoye) Rampant vigor, large leaves, numerous runners. Very large and uniform, dark red, glossy, conical fruit with superior flavor. Fruit size is maintained in 2°'s and 3°'s.

00-44-7 (Seneca x Chambly) Largest fruited selection of '00 seedling year. Size carries through in 2°'s and 3°'s. Variable oblate to wedge. Firm and excellent, balanced flavor. Plants are highly vigorous and healthy.

00-48-2 (Winona x RF 94-33-15) Very productive and vigorous, healthy plant. Very large dark red, excellent flavor. High yield potential. Bears fruit close to ground like 'Winona'.

00-60-50 (RF 94-11-2 x Winona) No apparent diseases. High vigor and huge leaves. Glossy orange-red fruit are tart but pleasing and form a very large, perfect wide conic.

00-62-1 (RF 94-15-15 x Honeoye) As firm as Seneca with very good flavor in large glossy red conic. Plants are vigorous with good runner production.

00-67-29 (RF 94-33-15 x RF 94-22-13) presents fruit in cluster at base of crown like many California cultivars. Plants below average vigor but superior yield potential. Long, very large, bright red, firm conic with horizontal calyx and tart, but pleasant flavor. Very juicy.

00-68-36 (RF 94-44-6 x RF 94-11-2) Large, upright vigorous plants with excellent runner production. This genotype is very productive and produces very large, firm, dark red, wide conics.

Pink-Flowered Strawberry Investigations

In Summer 1997 topcrosses were made using 'Lipstick' with 14 different strawberry clones including a broad cross section of commercial cultivars, highly disease resistant types and wild clones. The seeds, including F. virginiana and F. iinumae, were stratified September 1997 and germinated Winter 97-98. Approximately 1,243 seedlings representing these 14 progenies were field established Summer 1998. In Summer 1999, data was collected on flower color segregation and 39 selections were made. The goal is to develop a dual purpose high quality cultivar with carmine florets and good quality fruit. The initial results of the 14 progenies are as follows:

Percentages Pink-Flowered Strawberry Seedlings in Top Crosses

	Color Divisions[Z]				
Progeny[Y]	LP	MP	DP	W	Total Seedling Number
Honeoye	10[X]	4	0	86	52
Guardian	2	8	8	82	142
RF 90-21-43	21	0	2	77	61
Selva	15	0	0	85	26
Vesper	13	0	0	87	56
Idea	3	11	8	78	108
Geneva	22	8	0	70	37
Cavendish	7	7	9	77	56
Latestar	9	6	0	85	90
Hughes Co (F. virginiana)	7	5	4	84	145
Dunlap	5	10	5	80	79
F. iinumae	18	0	0	82	28
Crimson King	4	4	2	90	183
Settler	8	3	1	88	179

[z] Color divisions include LP, MP and DP- indicating light, medium and dark pink, respectively. Although all three pink divisions included clones with deeper petal striping, no attempt was made to categorize these separately. W = white.

[y] Each clone listed under 'Progeny' was hybridized with 'Lipstick'.

[x] Number indicates percentage of progeny displaying respective color/shade. Percentages are rounded off.

The percentage of pink-flowered seedlings in progenies ranged from 10 (Crimson King) to 30 (Geneva). Of the 39 selections made, most were deep pink, although at least one selection was made from each hybrid which necessitated in several cases, selecting even a "light pink" genotype. Selection criteria other than flower color included fruit size, vegetative vigor and disease resistance.

2000 JUNEBEARING STRAWBERRY CULTIVAR TRIALS

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The Junebearing strawberry cultivar trial contains 48 entries (19 cultivars, 29 advanced breeding selections -20, 5, 1, 2 and 1 selection(s), respectively, from UW-River Falls, Nova Scotia, University of Minnesota-USDA, Maine-USDA and USDA. The experimental plot design was a randomized complete block with 3 replications.

Methods

Location/ Climate: University of Wisconsin-River Falls; USDA Hardiness Zone 3b (-15^0 F guaranteed, - 42^0 F possible)

Soil Type: Sparta Sandy Loam, 2.1% organic matter, pH of 7.1

Planting: Bare root plants set 6/2/99

Spacing: 1 1/2 x 4 within and between rows, respectively, 16 plants per plot. Plant density = 7,260 plants per acre. Plot size was 4 feet x 20 feet.

Mulching: Plots were mulched with 6 inches of rye straw on December 10, 1999. Plots were uncovered April 27, 2000.

Irrigation: Overhead sprinkler irrigation was applied as needed according to Irrometer® tensiometer readings.

Fertilizer: 1. Boron at 2 lbs/acre one 9/29/99.
2. 45-0-0 broadcast at 80 lbs/acre 9/29/00.

Weed Control: Mechanical cultivation as needed during first growing season. Devrinol (50% WP), 8 lb/acre on October 26, 1999.

Pest Control: Thiodan (50% WP) - 2 lb/acre on May 29, 2000 and June 12, 2000 for tarnished plant bug.

Harvest Season: Early Season: 6/16 - 6/23/00 (3 harvests)
Total Season: 6/16 - 7/05/00 (7 harvests)

Results

The Fall of 1999 was very warm (November warmest on record for 150 years) December also began warm, but then a -17^0 F on 12/21 changed things dramatically. Even with a winter low of -24^0 F on January 21, the 99/00 winter was considered the warmest on record. Temperature extremes/snow cover conditions were:

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The harvest season began on June 16, (5 days early for this area) and extended to July 5. Fruits were of good quality with an average incidence of fruit rots. Due to the multiple frost control nights, bacterial angular leaf spot spread quickly through the field. No control measures were taken as we wanted to estimate cultivar tolerance levels. Yield, yield ranking and fruit size (1st and all harvests and rankings) for all cultivars and selections are presented in the following table.

Cultivar	YIELD		FRUIT SIZE			
	lbs/Acre	Rank[z]	Gm/Fruit (1st Harvest)	Rank	Gm/fruit - Avg (all Harvests)	Rank[y]
EARLY SEASON[x]						
RF 95-67-15[w]	8,484	18	10.8	43	7.1	40
RF 96-113-4	7,873	20	15.2	19	8.4	26
Sable	7,319	23	9.6	49	6.5	47
RF 96-70-15	5,516	34	15.3	18	10.0	15
Annapolis	3,654	47	9.7	48	6.6	46
EARLY MIDSEASON						
RF 96-70-12	8,986	15	12.0	38	8.2	28
MEUS 9	6,379	30	15.0	21	8.0	30
MNUS 492	5,630	33	15.8	17	9.7	16
Primetime	5,374	36	12.5	34	7.2	38
RF 96-66-20	5,258	37	10.3	47	7.5	34
RF 97-67A-11	5,124	40	12.1	37	7.0	42
MNUS 452	4,644	45	13.0	31	7.7	32
Evangeline	3,928	46	10.7	44	6.9	43
MIDSEASON						
Cavendish	10,236	6	19.2	6	10.5	11
RF 96-82-8	9,832	9	12.2	36	7.4	35
RF 97-67A-4	9,624	11	18.0	8	9.2	21
G19	7,631	22	13.9	26	11.1	9
Brunswick	6,844	27	14.5	23	8.1	29
RF 96-70-3	6,829	28	12.4	35	7.2	39
RF 96-13-34	6,787	29	11.1	41	6.3	48
K93-20	5,700	32	12.6	33	6.7	45
MNUS 377	5,401	35	13.6	28	9.5	18
MNUS 521	5,258	37	13.8	27	8.3	27
MEUS 8	4,931	41	13.2	30	7.8	31
RF 96-34-11	4,885	42	11.9	39	6.8	44
MNUS 552	4,818	43	14.4	24	9.1	22
Honeoye	4,775	44	13.4	29	8.8	23
Northeaster	2,771	48	12.9	32	8.5	25
LATE MIDSEASON						
RF 97-12-2	16,651	1	22.8	2	12.2	6
Mesabi	14,856	2	15.9	16	9.6	17
RF 95-129-14	12,088	3	11.0	42	7.1	41
RF 97-12-1	11,342	4	23.8	1	12.4	5
Kent	10,176	7	11.8	40	7.3	36
RF 97-75-7	9,840	8	17.5	9	11.9	7
B440	9,520	12	16.0	14	13.7	3
Darselect	9,113	14	14.6	22	10.4	12
RF 95-36A-10	8,548	17	18.4	7	10.3	13
RF 97-75-4	7,640	21	16.6	12	9.4	19
Mira	6,907	26	10.5	46	7.3	37
RF 96-86-3	6,119	31	17.4	10		

	YIELD		FRUIT SIZE			
Cultivar	**lbs/Acre**	**Rank**	**Gm/Fruit**	**Rank**	**Gm/fruit Ave**	**Rank**
LATE						
AC Yamaska	10,249	5	20.4	5	16.0	1
Winona	9,667	10	20.5	4	15.5	2
RF 97-65-3	9,299	13	16.0	15	11.6	8
AC L'Acadie	8,947	16	10.6	45	10.2	14
Cabot	8,204	19	21.6	3	13.3	4
Jewel	7,232	24	16.6	13	8.7	24
RF 97-79-19	7,037	25	14.3	25	10.6	10
Joliette	5,125	39	14.9	20	9.3	20

[z] Yield ranking of all 48 cultivars and advanced selections relative to one another. 1 = Best; 48 = Worst
When two genotypes performed identically, the next higher or lower rank consecutive number was assigned randomly.

[Y] Fruit size ranking of all 48 cultivars - selections relative to one another for all harvests.
1 = Largest; 48 = Smallest

[X] Cultivars/selections categorized by ripening season based on percentage of crop ripe in 1st 2 harvests.

[W] RF designates a selection from UW-River Falls Breeding Program

1. **Cavendish (K83-4) Named after the most popular tourist location of Prince Edward Island.**
   Parentage: 'Glooscap' x 'Annapolis'
   Origin: Agriculture Canada, Kentville, Nova Scotia, 1990.
   Season: Midseason
   Fruit: Very large globose conic to wedge shape. Size retained over several harvests. Color dark red with medium red flesh. Firm flesh and medium firm skin. Flavor slightly superior to Annapolis. May have green shoulders and non-uniform coloring in some situations. Midday evaporative cooling and proper nitrogen level management may curtail the problem.
   Disease: **Resistant** - A-4, A-6 and A-7 races of red stele
   Tolerant - *Verticillium* wilt, *Botrytis* fruit rot, leaf scorch, leaf spot
   Susceptible - green petal disease, powdery mildew
   Plants: Moderately vigorous, reportedly productive, 85-90% of 'Kent' yields.
   Yield Performance: Wisconsin-high; Minnesota-very high (Grand Rapids), above average (Morris), low (Excelsior); SW Michigan-very high.

2. **Chambly (SJ84187-3) Named after a garrison town between the St. Lawrence and Hudson rivers in SW Quebec.**
   Parentage: 'Sparkle' x 'Honeoye'
   Origin: Agriculture Canada and McGill University, Quebec, 1990.
   Season: Midseason
   Fruit: Medium size conic shape moderately firm fruit with white raised neck; average firmness. Shiny deep red skin with red flesh. Prone to excessive darkening when approaching overripe condition. Easily capped like 'Glooscap'. For fresh market or processing. Good flavor.
   Disease: **Resistant -** leaf scorch, powdery mildew
   Tolerant - leaf blight
   Susceptible - red stele
   Plants: Low vigor, medium size, thinly foliated. Reportedly good winter hardiness.
   Yield Performance: Wisconsin - average; has outyielded 'Honeoye', 'Sparkle', 'Redcoat' and 'Bounty' in Quebec trials. High yields in SW Michigan.

3. **DelMarvel (MDUS 4923) Named after the peninsula where it first fruited.**
   Parentage: Earliglow x Atlas
   Origin: USDA, Maryland, 1994
   Season: Early midseason
   Fruit: Large, symmetrical with firm flesh and skin. Very attractive, aromatic berries with excellent flavor like 'Earliglow'. Good storage and shipping characteristics.
   Disease: **Resistant** - 5 races of red stele and most leaf diseases, Anthracnose
   Tolerant - Fruit rots
   Susceptible -
   Plants: Very vigorous, prolific runner production. Adapted to sandy or heavier soils. Probably borderline winter hardiness for Midwest.

Yield Performance: Good in MD, NJ and OH. SW Michigan-high. Wisconsin-low (UW-River Falls). Iowa Ave.

4. Idea (NF-1584-86-3)

Parentage: [(Gorella x MDUS 3816) x Tioga] x Etna
Origin: Italian Breeding Program, Cesena, Italy, 1991.
Season: Late
Fruit: Maintains good fruit size throughout season. Large berries are very light red, moderately firm; mild, pleasant flavor.
Disease: **Resistant -** Unknown
Tolerant - anthracnose
Susceptible - Leaf spot, (v.sus.) leaf scorch (v.sus.)
Plants: Winter hardiness unknown. Parentage would indicate insufficient hardiness for Midwest-no winter injury UW-River Falls, Winter '96-'97.
Yield Performance: Wisconsin-average (UW-River Falls). Very high yields at Nourse Farms in MA.

5. Latestar (MDUS 5084)

Parentage: Lateglow x Allstar
Origin: USDA, Beltsville MD. 1995
Season: Late Midseason
Fruit: Very large, glossy red. Pleasant mild flavor and aroma; outstanding firmness. Size declines somewhat rapidly over season.
Disease: **Resistant -** Red stele, leaf diseases
Tolerant - Unknown
Susceptible - Unknown
Plants: Vigorous. Some runnering problems, does not renovate well under some conditions. No winter hardiness problems Winter '96-'97-UW-River Falls. Probably insufficient hardiness further north.
Yield Performance: Wisconsin- High-(UW-River Falls). Very high yield potential in East. SW Michigan-high.

6. Marmolada

Parentage: Gorella x Salvi 15 or Sel. no. 8 (possibly Driscoll cv. 'Heidi')
Origin: C.I.V. Program, Comocchio Ferrara, Italy, 1989.
Season: Midseason
Fruit: Very attractive glossy medium red conic; bright red flesh, very large, good firmness and acceptable, sweet flavor. Excellent shelf life.
Disease: **Resistant -** Unknown
Tolerant - Rhizoctonia & anthracnose rots, *Botrytis*, bacterial angular leaf spot, *Verticillium* wilt.
Susceptible - Unknown
Plants: Good vigor, erect inflorescence. Some winter injury winter '96-'97 UW-River Falls. For "Hill System" of culture.
Yield Performance: Wisconsin-above average (UW-River Falls). Very high in New Jersey.

7. Mohawk (MDUS 5122)

Parentage: MDUS 4587 x Earliglow
Origin: USDA, Maryland and Ontario Ministry of Agriculture, 1994.
Season: Very early to early midseason (earlier than 'Veestar' in Canada)
Fruit: Medium size, similar to 'Earliglow'. May have some irregular-shaped berries—wide conic. Excellent color and flavor, medium firm. Not as tough-skinned as 'Earliglow'.

Disease: **Resistant** - 5 races of red stele
Tolerant - fruit rots, powdery mildew
Susceptible - Unknown
Plants: Very vigorous plants and good, runners freely. Probably borderline winter hardiness in Midwest.
Yield Performance: Lower yields than 'Veestar' in Ontario and Maryland; SW Michigan, Wisconsin (UW-River Falls), and Iowa-low

8. Northeaster (MDUS 4787) Named after typical strong northeast winds on the East Coast.
Parentage: MDUS 4380 x Holiday
Origin: USDA, Maryland, 1994.
Season: Very early to early midseason
Fruit: Very large, very firm, dark red skin color, good medium flesh color. King berries may be slightly rough. Intense, aromatic flavor like 'Holiday'.
Disease: **Resistant -** 5 races of red stele
Tolerant - Unknown
Susceptible - powdery mildew
Plants: Large plants, but sparse runnering on sandy soils. Probably borderline winter hardiness in Midwest.
Yield Performance: Average in Ohio, New Jersey and Maryland. SW Michigan, Minnesota, and Iowa-very low.

9. Oka (SJ83184-3) Named after a community at the mouth of the Ottawa River near Montreal.
Parentage: 'K75-13' ['K71-8' ('Salinas' x 'K60-98') x 'MicMac'] x 'Honeoye'
Origin: Agriculture Canada and McGill University, Quebec, 1991.
Season: Midseason
Fruit: Large size, moderate firmness. Medium red with light red flesh. Very good flavor similar to 'Sparkle' or 'Glooscap'. For PYO markets.
Disease: **Resistant -** Unknown
Tolerant - Powdery mildew, leaf scorch, leaf spot.
Susceptible - Unknown
Plants: Medium size and vigor. Survived test winter in River Falls with no injury. Good runner production. Somewhat more tolerant to terbacil than 'Kent' and 'Bounty'.
Yield Performance: Wisconsin - very high (River Falls); has outyielded 'Glooscap' and 'Kent' in Quebec and New Brunswick Canada.

10. Primetime (MDUS 5069)
Parentage: [(Sunrise x MDUS 3082) x Earliglow]
Origin: USDA, Maryland, 1995.
Season: Midseason
Fruit: Very large, moderate firmness, very good flavor, attractive.
Disease: **Resistant -** red stele, Verticillium wilt
Tolerant - Unknown
Susceptible - powdery mildew
Plants: Vigorous. Adaptable to various soil types. No winter injury UW-River Falls '96-'97.
Yield Performance: Wisconsin - average (UW-River Falls); SW Michigan-average.

11. St. Clair (GU62E55)
Parentage: GU18B34 x GU71M59
Origin: University of Guelph, Ontario, 1992.

Season: Late midseason
Fruit: Medium-large size, dark red (possibly too dark) with excellent but somewhat acidic flavor. Only average firmness. Good for freezing.
Disease: **Resistant -** leaf scorch, powdery mildew, race A-6 of red stele
Tolerant - Unknown
Susceptible - Unknown
Plants: Vigorous, runners freely. No winter injury 3 years at UW-River Falls.
Yield Performance: Wisconsin - high (River Falls); average-high in Ontario.

12. St. Williams (V7261-3)

Parentage: 'Guardsmen' x 'V6744R-6' ('Veestar' x 'NY844')
Origin: Horticultural Research Institute of Ontario, 1992.
Season: Late midseason
Fruit: Average size, high quality, rated "outstanding" for freezing.
Disease: **Resistant-** leaf spot, leaf scorch, powdery mildew
Tolerant- *Botrytis* rot, *Verticillium* wilt
Susceptible- Unknown
Plants: Small, extremely vigorous with wide adaptation, runners well
Yield Performance: Wisconsin - high (River Falls); high yields in Ontario.

13. Scotland (V 7251-1)

Parentage: 'Guardian' x ('Veestar' x 'NY844')
Origin: Horticultural Research Institute of Ontario, 1991.
Season: Very late
Fruit: Very large fruit and extremely firm with tough skin - may be too firm for PYO. Decaps easily. Medium red skin and flesh throughout. Makes a good frozen product.
Disease: **Resistant -** leaf scorch
Tolerant - *Verticillium* wilt, *Botrytis* rot, powdery mildew.
Susceptible - Unknown
Plants: May be too tender except in extreme southern Wisconsin (no injury River Falls 1990-1992). Vigorous plants runner well.
Yield Performance: Wisconsin-average to poor yields; excellent yields in Ontario; average to poor yields in Minnesota; SW Michigan-poor.

14. Selkirk (V7210-5)

Parentage: 'Earlibelle' x 'Holiday'
Origin: Horticultural Research Institute of Ontario, 1992.
Season: Early midseason
Fruit: Size halfway between 'Veestar' and 'Gov. Simcoe'. Very firm, attractive, red throughout. For PYO, prepicked or processing. Good fresh storage qualities.
Disease: **Resistant -** Unknown
Tolerant - leaf spot, *Botrytis* rot
Susceptible - leaf scorch, extremely to powdery mildew, *Verticillium* wilt
Plants: Good vigor, lacks winter hardiness at Grand Rapids, MN; no injury River Falls, WI 1990-1993.
Yield Performance: Wisconsin-average to low (River Falls); Minnesota-very low (Grand Rapids) to average (Excelsior).

15. Seneca (NY 1529)

Parentage: 'NY 1261' ('Redcoat' x 'NY844') x 'Holiday'
Origin: New York Agricultural Experiment Station, 1993.

Season: Midseason
Fruit: Large, very attractive exceptionally firm fruit (probably too firm) with tough skin. Good for fresh market or as frozen product. Only average flavor.
Disease: **Resistant -** Unknown
Tolerant - leaf spot
Susceptible - leaf scorch
Plants: Vigorous plants
Yield Performance: Wisconsin-high to very high (River Falls); below average in Illinois; SW Michigan-high.

16. Settler
Parentage: 'Guardian' x 'Holiday'
Origin: Horticulture Research Institute, Simcoe, Ontario, 1989.
Season: Early-midseason
Fruit: Very large and attractive, medium firmness, superior to 'Veestar', medium red skin and flesh; average skin strength. Very good flavor, better than 'Annapolis'.
Disease: **Resistant -** none
Tolerant - leaf spot, gray mold and *Verticillium* wilt
Susceptible - leaf scorch and powdery mildew, red stele
Plants: Poor winter hardiness. May be for trial in extreme southern Wisconsin. Very susceptible to Sinbar herbicide on sandy soils.
Yield Performance: Wisconsin-above average (River Falls); average yields in Minnesota; very high yields in Ontario; SW Michigan-low.

17. Startyme (225C1)
Parentage: B7705-3 (Selkirk x V9294-2) x GU66Q50
Origin: Horticultural Research Institute of Ontario, Simcoe, 1994.
Season: Late midseason
Fruit: Medium size, firm, conical, somewhat pale orange-red with average skin strength. Good flavor—has hollow cores and decaps easily.
Disease: **Resistant -** leaf spot
Tolerant - leaf scorch
Susceptible - powdery mildew
Plants: Above average vigor.
Yield Performance: Wisconsin (River Falls)-lowest yield of 33 cultivars tested in 1994; SW Michigan-average. Minnesota-low (Grand Rapids) to poor (Excelsior).

18. Winona (MNUS210) Named after town in SE Minnesota.
Parentage: Earliglow x MNUS 52 (Lateglow x MDUS4616)
Origin: University of Minnesota and USDA-Maryland, 1995.
Season: Late
Fruit: Attractive, very large glossy, medium red, firm, good texture and quality. Maintains size well. Skin breakdown in wet years with heavy canopy or too much nitrogen.
Disease: **Resistant -** red stele (5 races); black root rot complex, leave scorch, leaf blight
Tolerant - leaf spot, powdery mildew
Susceptible - Unknown
Plants: Vigorous, winter hardy. Fruit are held close to the soil, making harvest more difficult than many other cultivars.
Yield Performance: Wisconsin (River Falls)-high. Minnesota - most reports high.

1. **AC-L'Acadie (SJ8916-50)**
   - **Parentage:** 'Glooscap' x 'Guardian'
   - **Origin:** Agriculture and Agri-Food Canada, and McGill University, 1999.
   - **Season:** Midseason
   - **Fruit:** Uniform, firm, sweet, large, shiny pale-red, necked-conic. Decap easily. Good fresh storage characteristics and also freeze well. Good for pre-picked (and shipping) or PYO.
   - **Disease:** **Resistant -** Unknown
     Tolerant - Powdery mildew, leaf scorch, leaf blight, leaf spot, gray mold, 6 red stele races.
     Susceptible - Unknown
   - **Plants:** Tolerant to Sinbar. Perform well on both sand and heavy soils. Semi-vigorous and appear thus far, to have adequate winter hardiness.
   - **Yield Performance:** Similar to 'Kent', 'Glooscap' and 'Chambly' in Quebec.

2. **Brunswick (K90-12)**
   - **Parentage:** 'Cavendish' x 'Honeoye'
   - **Origin:** Agriculture Canada, Kentville, Nova Scotia, 1999.
   - **Season:** Early Midseason
   - **Fruit:** Large (but slightly smaller than Cavendish) attractive and uniform color and shape. Flavor is similar to 'Honeoye' and not as sweet as 'Cavendish'.
   - **Disease:** **Resistant -** Several races of red stele
     Tolerant - Unknown
     Susceptible - Unknown
   - **Plants:** No data available. Unknown winter hardiness for Midwest, but expectations are positive based on parentage.
   - **Yield Performance:** High in Morden, Manitoba and Fredericton, NB; average at other sites in Canada

3. **Cabot (K92-17)**
   - **Parentage:** K87-5 x K86-19 ('ArKing'x K79-5)
   - **Origin:** Agriculture Canada, Kentville, Nova Scotia, 1998.
   - **Season:** Mid - late season
   - **Fruit:** Bright red, juicy, very large! Primaries irregular, later fruit uniform. Firm flesh, average skin strength. Good for prepicked markets.
   - **Disease:** **Resistant -** Several races of red stele.
     Tolerant - Unknown
     Susceptible - gray mold (Botrytis)
   - **Plants:** With proper nutrition and water management, will be large with sufficient runners. Unknown winter hardiness for Midwest.
   - **Yield Performance:** Moderate and low, respectively for Grand Rapids and Excelsior, MN

4. **Evangeline (K93-1)**
   - **Parentage:** [('Honeoye' x 'Veestar') x NYUS 119]
   - **Origin:** Agriculture Canada, Kentville, Nova Scotia, 1999.
   - **Season:** Early
   - **Fruit:** Very firm, medium-sized, dark red conic with sunken achenes.
   - **Disease:** **Resistant -** Unknown
     Tolerant - Unknown
     Susceptible - probably tolerant or susceptible to red stele, according to breeder.

Plants: Flower slightly before 'Annapolis'. Fruit are held on upright, stiff peduncles. Unknown winter hardiness for Midwest, but expectations are positive based on parentage.

Yield Performance: Moderate in Canada, but breeder indicates reports may be low due to possible floret frost injury at various sites.

5. G19

Parentage: 'Chandler' x 'Holiday'

Origin: University of Guelph, HRIO, Simcoe, Ontario 1998.

Season: Midseason

Fruit: Large, same size as 'Kent', but fruit more pale shade. Very firm. Flavor similar to 'Kent'. Good for shipping, IQF or PYO.

Disease: **Resistant -** Unknown
Tolerant - leaf scorch, leaf spot, mildew
Susceptible - Unknown

Plants: Tolerant to Sinbar herbicide. Unknown winter hardiness, but parentage would suggest insufficient for Midwest. Vigorous, with pale leaves. Good runnering

Yield Performance: Unknown.

6. Joliette (SJ89288-2) Named after town located on l'Assumption River in southern Quebec

Parentage: Jewel x SJ85189

Origin: Agriculture Canada and St. Jean-Sur-Richelieu, Quebec, 1996

Season: Midseason

Fruit: Large, moderately firm globose conic to short wedge, light red with small white neck, decap easily.

Disease: **Resistant -** 6 races of red stele, leaf spot, leaf scorch, powdery mildew
Tolerant - Unknown
Susceptible - Unknown

Plants: Vigorous, medium size. Winter hardiness appears quite good, but no tests for Midwest. Adapted to heavy soils. Tolerant to terbacil herbicide

Yield Performance: High in Quebec. No reports for Midwest.

7. Mesabi (MNUS 248)

Parentage: Glooscap x MNUS 99 (WIUS 8002 x WIUS 8008)

Origin: University of Minnesota and USDA-Maryland. 1999.

Season: Late midseason

Fruit: Large, glossy, bright red with very good firmness and flavor

Disease: **Resistant -** Common races of red stele.
Tolerant - Unknown
Susceptible - Unknown

Plants: Good winter hardiness. Poor runnering UW-River Falls.

Yield Performance: Minnesota-very high (Grand Rapids & Excelsior)

8. Mira (K84-5)

Parentage: Scott x Honeoye

Origin: Agriculture Canada, Kentville, Nova Scotia, 1996.

Season: Late midseason

Fruit: Large, blocky conic, bright medium-light red. Mild flavor.

Disease: **Resistant -** Most foliar pathogens, most races of red stele.
Tolerant - Unknown
Susceptible - Unknown

Plants: Vigorous. No winter injury Winter '96-'97 UW-River Falls.

Yield Performance: Wisconsin- Above average (UW-River Falls); Minnesota-average (Grand Rapids) to high (Excelsior). Very high potential in Nova Scotia and other Atlantic provinces. In the past, Kentville cultivars have performed admirably in Wisconsin.

9. NJUS 8826-11

Parentage: NJ8219-2 x 5130 (Earliglow)
Origin: Rutger University Research Center at Cream Ridge NJ, 1996.
Season: Early
Fruit: Large, excellent appearance and good flavor.
Disease: **Resistant -** Overall good resistance.
Tolerant - Unknown
Susceptible - Unknown
Plants: Vigorous, very adaptable. Good overall balance. Winter hardiness unknown. Adapted to most planting systems.
Yield Performance: High productivity in east. No reports for Midwest.

10. Sable (K90-1)

Parentage: 'Veestar' x 'Cavendish'
Origin: Agriculture Canada, Kentville, Nova Scotia, 1998.
Season: Early
Fruit: Attractive bright red. Larger and more firm than 'Veestar' but less firm than 'Annapolis'. Very good flavor. Niche for PYO but not prepicked.
Disease: **Resistant -** several races of red stele
Tolerant - Unknown
Susceptible - Unknown
Plants: Vigorous; unknown winter hardiness for Midwest. Good runnering ability
Yield Performance: More productive than 'Veestar' in Nova Scotia. Kentville cultivars have performed quite well overall in the Midwest in the past. High - Grand Rapids, MN and low at Excelsior, MN.

11. AC-Yamaska (SJ89700-1) Named after town located near the shore of Lake Saint-Peter, a widening of the St. Lawrence River in Quebec

Parentage: 'Pandora' x 'Bogota'
Origin: AC (Agriculture and Agri-Food Canada) and St. Jean-Sur-Richelieu, Quebec, 1999.
Season: V. late (5-7 days past 'Bounty')
Fruit: V. large dk. red glossy fruit. Good fresh storage characteristics.
Disease: **Resistant** - Unknown
Tolerant - Leaf scorch, leaf blight, leaf spot, gray mold, powdery mildew.
Susceptible - 6 red stele races.
Plants: Perform well on sand or heavier soils. Appear so far to have sufficient winter hardiness based on Canadian reports.
Yield Performance: Quite concentrated. Similar total production to 'Kent', 'Glooscap' and 'Chambly' in Quebec.

1. Capitola (CN93) Named after a town by that name near location of UC Watsonville Strawberry Research Facility.

Parentage: 'CN25' (CA75.121-101)x 'Parker'
Origin: University of California, 1990.
Season: Stronger day-neutral than 'Seascape'
Fruit: Attractive, softer than 'Douglas', but 25% more acid. Good flavor. Medium large and firm. Less size variation than 'Seascape'.
Disease: **Resistant -** Unknown
Tolerant - (Highly) of virus diseases common in CA
Susceptible - leaf spot
Plants: Higher temperature tolerance than other day-neutrals; should be grown with runners removed.
Yield Performance: Very high yield potential. High-1992; low-fall 1993 at Grand Rapids, MN.

2. Seascape (CN49) Town near University of California Watsonville Strawberry Research Facility

Parentage: 'Selva' x 'Douglas'
Origin: University of California, Davis, 1989.
Season: Day-neutral (not as strong as 'Selva')
Fruit: Large, 70+ gm berries, medium firm, dark red skin and flesh. Very good flavor. Medium long; conic. Similar firmness to Selva. More fruit size variation than 'Capitola'. Prone to some cracking around calyx.
Disease: **Resistant -** Verticillium wilt, leaf scorch, powdery mildew
Tolerant - Unknown
Susceptible - leaf spot
Plants: More runners than 'Capitola'.
Yield Performance: Low to average - Grand Rapids, MN, 1992-1993.

3. Sunset (CN201)

Parentage: CA75.121-101 (day-neutral parent of 'Capitola') x CA81.16-604 ((CA71.98-605 x Selva) x Chandler)
Origin: University of California-Davis, 1993.
Season: Day-neutral - moderate expression, more so than 'Selva' and 'Seascape' but less so than 'Fern'.
Fruit: Flat conic, sometimes heart-shaped; medium-red interior-exterior, glossy; larger than 'Selva' or 'Seascape'. Firmness similar to 'Seascape'. Good flavor but not equal to 'Seascape'. Acceptable for fresh eating or processing.
Disease: **Resistant -** Unknown
Tolerant - viruses found in CA
Susceptible - leaf spot, powdery mildew
Plants: More vigorous than 'Selva' or 'Seascape'.
Yield Performance: Higher yields than 'Selva' or 'Seascape' at Watsonville, CA.

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A 21-question survey was handed out at the annual conference last year in Madison. Approximately 50 farms were represented at the meetings and 43 surveys were completed. This was an excellent response – and greatly appreciated! As I explained at the conference, the results tabulated from these surveys help me learn as much as possible about my clientele – You the berry grower. The more I know about berry businesses in Wisconsin, the better I am able to serve you. Educational and research activities are planned, in part, based on the results. The results presented in this article are also published for you, since knowing more what your neighbors are all about may help you coordinate activities, adjust prices, change growing practices or cropping combinations, consider planting different cultivars or possibly consider changing your marketing strategies.

There is considerable difficulty though, in determining just how accurate the survey is. Based on the acreage represented in the survey compared to that reported in the annual publication, "Wisconsin Agricultural Statistics" (and also upon my knowledge of the Wisconsin Berry Industry), about 20 – 35% of all the berry farms in Wisconsin were represented. This level of representation would suggest relatively good agreement between reported results and the actual situation in Wisconsin. Limitations do exist – it is probable that since the meetings were held in Madison last year that northern growers are under-represented proportionally in the survey. This probability is supported by comparing WBGA member distribution acreage in the state with survey results. Blueberries, for example, while not planted on large acreages in the state, were proportionally under-represented in the survey. The size of grower acreages (whether large or small) can also "skew" results when averages are computed. (This does not mean that I don't want large and small growers to complete surveys!!) If we also assume that a higher proportion of more "progressive" growers attend annual conventions, then results can also be skewed.

Number of Years Growers in Business

Years	# of Growers	Percentage of Growers
1-3	6	14%
4-8	12	28%
9-15	10	23%
+15	15	35%

Average years in business = 13

Level of Commercialization As Perceived by the Grower

Category	# of Growers	% of Total
Hobby	2	4.5%
Commercial Part-Time Supplemental income	20	46.5%
Commercial Full-Time Major source of income	21	49%
Total	43	100%

		(% of Total)
Northern	3	(7%)
Central	8	(19%)
Northeastern	8	(19%)
Southern	10	(23%)
Southeastern	4	(9%)
Western	10	(23%)
Total	43	100%

Cropping Characteristics

	Acreage Range	Average Acreage	Total Acreage
Straw-berries n=38	0.25-45.0	8.4	320
Rasp-berries n=21	0.10-8.0	1.9	39.9
Blue-berries n=4	0.125-2.0	0.63	2.5
Other Small Fruits n=3	0.125-1.5	0.88	2.6
Tree Fruits n=6	0.5-25.0	10.3	61.5
Vege-tables n=18	1.0-60.0	11.9	215.0

Crop Category	% of Growers in Each Acreage Category				
Straw-berries 93% n=38	0-2Acres 21%	3-5 24	6-10 34	11-20 16	>20 5
Rasp-berries 49% n=21	≤.5 Acres 43%	.6-1.5 19	1.6-2 9.5	>2 28.5	
Blue-berries 10% n=4	<.25 Acres 50%	.25-1.0 25	>1 25		
Other Small Fruits 7% n=3	<.5 Acres 33%	.5-1 33	>1 33		

Wisconsin Region	Strawberry Acreage	Raspberry Acreage	Blueberry Acreage
Northern	17.5	1.0	0.0
Western	61.25	8.0	0.25
Central	49.75	6.35	4.0
Northeastern	33.0	5.21	0.0
Southeastern	45.0	13.0	0.0
Southern	72.0	7.5	0.0
Total	278.5	41.06	4.25

Wisconsin Region	Other Small Fruit Acreage	Tree Fruit Acreage	Vegetable Acreage
Northern	0.0	0.0	2.0
Western	0.0	0.0	0.0
Central	0.0	0.5	75.0
Northeastern	0.125	45.0	53.0
Southeastern	0.0	0.0	56.0
Southern	2.5 (grapes)	11.0	11.0
Total	2.625	56.5	197.0

Number of Growers in Each Crop Combination Category
N=42

Grow only one crop	Grow two crops	Grow three crops	Grow four or more crops
17 (40%)	13 (30%)	7 (16%)	6 (14%)
Strawberry 14 (33%)	Combi-nations	Combi-nations	Combi-nations
Raspberry 3 (7%)	(5)	Strawberry Raspberry Vegetable (6)	Raspberry Tree Fruit Vegetable (3)
Note: Strawberry part of crop combina-tion in 93% of small fruit farms.	Strawberry Vegetable (5)	Strawberry Tree Fruit Vegetable (1)	Strawberry Raspberry Blueberry Vegetable (1)
Note: Raspberry part of crop combina-tion in 50% of small fruit farms	Raspberry Vegetable (2)		Strawberry Raspberry Blueberry Other Fruit (1)
Note: Vegetable part of crop combina-tion in 45% of small fruit farms.	Blueberry (1)		Strawberry Raspberry Blueberry Tree Fruit Other Fruit (1)

Cultural Procedures

Spacing Distance		
W/in Row	7-30 in.	18.6 in.
Between Row (on center)	24-60 in.	44.1 in.
Matted Row Width	9-32 in.	19.2 in.

- 6.5% of growers have tried various versions of

plasticulture
- 90% of growers scout for pests and employ IPM techniques
- 98% of strawberry acreage is winter mulched (4 growers reported less than 100% mulch)
- 99% of strawberry acreage is irrigated (2 growers reported less than 100% of their acres irrigated)
- 4.7% of growers use some trickle irrigation.
- Growers should strive for 10,000+ lb/Acre yields to remain profitable.

Cultivar Choice

Do you Test Trial Cultivars Before Planting More than 1 Acre?

Response	# of Growers	%
Yes	32	74.0
No	11	26.0
Total	43	100

What Size Test Planting do you Base your Decisions upon to Plant Larger Acreages of New Cultivars?

Range = 280 ft^2 (50 plants) to 1 acre
(43,560 ft^2 – 7,850 plants)

Average = 6,310 ft^2 (1,137 plants)

Distribution	
# Plants Tested	# of Growers
50-100	2
101-250	2
251-500	8
501-1000	14
1001-1500	2
1501-2000	1
2001+	3
	32

Total Acreage Represented= 322.22 Acres

Cultivar	# of Growers Involved	% of Acreage
Honeoye	33	34.8
Jewel	27	17.3
Annapolis	21	12.6
Cavendish	21	8.9
Glooscap	19	6.7
Kent	6	4.5
Winona	20	3.9
Allstar	3	2.4
Raritan	2	2.1
Sparkle	4	1.5
Earliglow	4	1.2
Northeaster	10	1.0
Mira	4	0.9
Mohawk	3	0.8
Lester	1	0.4

Chandler	1	0.3
Delmarvel	2	0.2
Redchief	2	0.2
Veestar	1	0.1
Seneca	1	0.1
Lateglow	1	0.05
Primetime	2	0.05
		100.00%

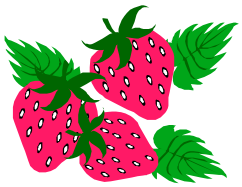
Marketing

Proportion of Wisconsin Strawberry Crop Sold Through Various Marketing Channels

Marketing	Percent of Crop	Grower Range
PYO	65	0-100%
Prepicked – On Farm	22	0-100%
Direct – Marketed Off Farm	11	0-85%
Wholesale	2	0-25%
Total	100%	
Total Acreage Represented = 320 N= 38		

Strawberry Prices at Wisconsin Small Fruit Farms

Pick-Your-Own	.73-$1.05/lb	.86/lb
Pre-picked	$1.10-2.70/lb	$1.74/lb
N= 34		



I will continue with discussions on strawberry statistics and compare them to a previous survey in future articles. I will also provide the remaining survey information regarding **Raspberries** in the next newsletter.